calf veins that previously were not visualized and seven were seen in femoral veins or calf veins that previously were visualized and did not have clot (Table).

Conclusions: Nonvisualized calf veins are common in DUS imaging. Almost half of patients with nonvisualized veins on the initial DUS imaging had successful visualization on subsequent DUS scans. Lower body weight, whole leg swelling, single vein nonvisualization, and single limb nonvisualization on the initial DUS scan were associated with successful visualization on subsequent DUS scans. Of patients with nonvisualized veins on the initial DUS scan, 4.8% go on to develop VTE, and 8.8% of patients who have subsequent DUS scans are found to have DVT. When the initial DUS scan is unable to visualize calf veins, a repeat DUS scan may be useful to identify new or initially unseen DVT.

Table. Factors associated with development of subsequent venous thromboembolism (VTE) or successful calf vein visualization on subsequent duplex ultrasound (DUS) scans after nonvisualization of calf veins on the initial DUS scan

	Development of subsequent VTE	*Successful visualization of calf veins on subsequent DUS*
Factor	P *value,* χ^2 *or t-test*[a]	P *value,* χ^2 *or t-test*[a]
Demographics		
Gender	1.000	.187
Age	.440	.726
Height	.884	.861
Weight	.580	.0497
Body mass index	.532	.056
Well's score criteria		
Active malignancy	.210	.125
Recent surgery or trauma	.105	.832
Whole leg swelling	.984	.025
Calf swelling	1.000	.058
Pitting Edema	.513	1.000
Prior DVT	1.000	.578
Collateral superficial vein	1.000	.453
Paralysis, cast or, immobilization	.783	.344
Pain along deep veins	.435	1.00
Alternative diagnosis	.533	.650
Well's score	.833	.071
Initial DUS		
Single or multiple nonvisualized veins	.826	< .001
One or both lower extremities	1.000	.021
Reason for nonvisualization		
Bandage	.626	.294
Body habitus	.502	.157
Wound	1.000	.453
Edema	.822	.063
Multiple	.610	1.000
Reason for DUS		
Concern for PE	.103	.042
Lower extremity swelling	.132	.045
Abnormal laboratory values	1.000	.453
Pain	.718	.448
Other	1.000	.546
Multiple	.264	.184
Postimaging anticoagulation	.410	1.000

DVT, Deep vein thrombosis; *PE*, Pulmonary embolism.
[a]$P < .05$ is statistically significant.

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Postoperative Transfusion Is Associated With a Dramatic Increase in 30-Day Morbidity and Mortality in Patients Undergoing Major Vascular Surgery

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Objectives: Blood transfusions are very common among patients undergoing major vascular surgery. Prior studies suggest an association between blood transfusion and increased morbidity and mortality among patients undergoing cardiac surgery. The effect of transfusion on patients undergoing vascular surgery has been poorly defined.

Methods: We examined data from a large multicenter quality improvement vascular surgical registry of all patients undergoing elective or urgent open peripheral arterial disease (PAD) procedures, endovascular aneurysm repair (EVAR), or open abdominal aortic aneurysm (AAA) repair between 2012 and 2013. Emergency cases, carotid endarterectomy, and carotid artery stenting were excluded. Univariate and multivariate logistic regression modeling was used to identify the effect of transfusion on outcomes and predictors of transfusion. All regression models had a Hosmer-Lemeshow $P > .05$ and area under receiver operating characteristic curve of >0.8, confirming excellent goodness of fit and discrimination.

Results: Our study population comprised 2946 patients who underwent open PAD procedures (n = 1744), open AAA (n = 175), or EVAR (n = 1027) at 22 hospitals. The overall transfusion rate was 18%, at a median nadir hemoglobin of 7.7 g/dL. Adjusting for major covariates, including preoperative anemia (hemoglobin <12 g/dL), medications (including antiplatelets and anticoagulants), demographics, and comorbidities, transfusion was independently associated with myocardial infarction (odds ratio [OR], 10.1; 95% confidence interval [CI], 5.2-19), death (OR, 3.8; 95% CI, 2.1-7), surgical site infection (OR, 2.2; 95% CI, 1.3-3.5), and pneumonia (OR, 8.9; 95% CI, 4.1-19). Independent factors predicting transfusion included female gender (OR, 2.2; 95% CI, 1.7-2.7), body mass index (OR, 1.005; 95% CI, 1.002-1.01), preoperative anemia (OR, 3.1; 95% CI, 2.4-3.8), congestive heart failure (OR, 1.4; 95% CI, 1.1-1.9), clopidogrel (OR, 1.7; 95% CI, 1.3-2.2), open AAA repair (OR, 10.1; 95% CI, 6.5-15.5), open bypass (OR, 3.1; 95% CI, 1.9-5.2), and urgent procedures (OR, 1.4; 95% CI, 1.01-1.8).

Conclusions: Postoperative transfusion in vascular surgical patients is independently associated with increased 30-day mortality and morbidity. The risk of adverse cardiovascular events, including myocardial infarction, was worsened rather than improved with transfusion. These data suggest the need for a prospective comparative hemoglobin threshold study in vascular surgical patients.

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A Novel Atraumatic Method of Arterial Plaque Debulking

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Objectives: Current percutaneous vascular interventions to treat severe atherosclerosis induce mechanical or thermal injury to the vessel wall, which stimulates the development of neointimal hyperplasia and results in restenosis. The objective of this study was to develop a paradigm-shifting methodology to reduce plaque burden without inducing trauma to the arterial wall. We hypothesized that a digestion solution tailored to the components of atherosclerotic plaques would effectively digest plaques in situ.

Methods: After IRB approval, carotid plaques from endarterectomies were collected, sectioned (200-mg segments), and exposed to our digestion solution (10 mg/mL collagenase types I, III, IV, V, and 10mM $CaCl_2$) with ultrasonic sonication (20 kHz) at 42°C, pH 7.2, for 20 minutes. Specimens were weighed at baseline and every 10 minutes. Superficial femoral and popliteal arteries were harvested from limb amputations and cut into 3-cm sections. The lumen was exposed to our digestion solution or phosphate-buffered saline (PBS), with or without ultrasonic sonication, for 1 hour or 20 minutes. Arterial segments were mounted in paraffin, sectioned, and stained with hematoxylin and eosin, van Gieson, and Masson trichrome. Plaque and medial area from five sections spaced 0.2 mm apart were analyzed for each artery.

Results: First, we evaluated our optimized digestion solution with sonication on the harvested human plaques. We found that our therapy reduced plaque mass by 75% ± 6% at 15 minutes and by 86% ± 3% at 30 minutes vs PBS with sonication (12% ± 4% at 20 minutes; $P < .05$). Next, we evaluated the efficacy of our digestion solution on intact arteries. Our digestion solution with sonication resulted in 92% reduction of the plaque area compared with PBS with sonication at 1 hour (31%; $P < .05$). Medial area was constant across all groups. Notably, the internal elastic lamina was intact after